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TITLE: The Use of Cognitive Task Analysis and Simulators for After Action Review of Medical Events in Iraq

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14. ABSTRACT

Prior attempts to use standard interview protocols to extract After Action Review (AAR) descriptions of emergency event decision making and problem solving strategies generated by participants are problematical. Cognitive psychological studies suggest that the resulting information often contains significant errors and omissions (Glaser et al., 1985; Besnard, 2000). These errors are not often recognized by participants who solved important problems in emergency situations and wish to give accurate reports on their solutions because the knowledge they are describing is largely automated and unconscious (Wheatley & Wegner, 2001). The problem is further complicated by the fact that experienced medical personnel mistakenly believe that their reports are complete and accurate and that they solved the problems they are describing in a conscious, willful, deliberate manner (Wegner, 2002). These reporting errors most likely increase in number and severity under time-pressure battlefield situations (Hunt & Joslyn, 2000). This research attempts to improve medical AAR with a novel combination of Cognitive Task Analysis conducted while interviewees moulage simulators (Clark and Estes, 2002; Clark & Estes, 1996' Velmahos et al, 2002). Three medical experts who have experienced and solved the same type of important medical problem in Iraq will be interviewed separately and together. It is hypothesized that interview protocols employing a novel combination of medical Cognitive Task Analysis combined with the moulage of simulators will more accurately capture the mix of automated and conscious decisions used to solve critical medical problems on the battlefield in Iraq. Each expert will be interviewed separately and after reviewing the results, the other two experts will be asked to correct and improve on the information gathered from the "other" experts. This process has been found to identify and eliminate errors as well as provide accurate and efficient descriptions of medical decisions and actions that solved battlefield problems.

15. SUBJECT TERMS
After Action Review, Cognitive Task Analysis, Medical Simulators, Iraq, Training

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INTRODUCTION

This study is designed to test a novel approach to medical after action reviews (AAR) by employing a cognitive task analysis (CTA) interview protocol with surgeons who are asked to moulage a medical simulator while being interviewed. The research design calls for the interview of three surgeons who were deployed in a Forward Surgical Team (FST) in Iraq and who made a novel and innovative use of Argyle shunts to repair damaged femoral arteries. Each surgeon will be interviewed separately and asked to describe how to perform a routine medical procedure and how they employed Argyle Shunts under battlefield conditions. The accuracy and completeness of the interview data will be analyzed to determine the gain or loss of AAR fidelity due to CTA use with simulators.

BODY

This part of our report is divided into two sections. In this first section, we review our accomplishments during our first year in relation to the Statement of Work (SOW) approved in our proposal.

In the second section, we describe a number of communication and coordination problems we have experienced in the past year while attempting to lower the overhead on our grant and misunderstandings about our HSRRC approval process.

Section 1: SOW Progress

This section of report is constructed around the five items on our approved SOW. After listing each SOW item, we report the progress we have made to complete the item.

1) **Work with designated Army POC to identify and schedule interviews with three medical personnel who separately experienced and solved an important medical problem.**

   Our POC, Dr. Carla Pugh, helped us connect with COL: John Holcomb at Ft. Sam Houston who put us in touch with a number of Army surgeons who had returned from Iraq, including one who had been assigned to an FST. After sending the email solicitation, two FST surgeons volunteered to be interviewed. Dr. Clark traveled to Ft. Sam Houston for the interviews during the first week of April 2005.

2) **Develop an interview protocol based on Cognitive Task Analysis (CTA) and arrange for the use of medical simulators to be used during the interviews. emergency or event.**

   Starting at the beginning of the project, the research team developed a CTA interview protocol which was reviewed, tested in the interview with Surgeon #1 and revised again by the research team. The current version of the CTA interview protocol is attached as *Appendix A* at the end of this report.

3) **Conduct the CTA interviews with each of the three participants separately, keeping a video and audio record of the result as described in the methods section and in the approximate sequence listed in Figure 1 (in the proposal).**

Three interviews were conducted by Dr. Clark in early April with "Surgeon #1" at Fort Sam Houston. An interview was also scheduled with a second surgeon but he was called away on an emergency assignment and was unavailable to Dr. Clark before he was forced to return to Los Angeles. An audio record of the interview with Surgeon #1 was obtained. The video equipment malfunctioned and a video record of the first interview is not available. We were unable to schedule any further interviews with surgeons who had used the Argyle Shunt before the end of the contract year for reasons described in the second part of this report.

4) **Summarize each interview as a procedure listing the types of information gathered.**

The interview with Surgeon #1 was conducted and audio taped. The tape was transcribed and the transcription was edited into the CTA format following the CTA protocol described in Appendix A. The edited CTA was submitted to Surgeon #1 for correction and editing. The edited CTA for Surgeon #1 is included as *Appendix B: CTA of Argyle Shunt Procedure – Surgeon #1.*

5) **Write and submit a final report at the end of the project that answers the following questions: a) what important medical event(s) was/were encountered? b) What aspects of their prior training helped prepare the medical experts for the event and what additional preparation would help new medical personnel to deal more effectively with similar events?; c) What solution(s) were developed in the field that should be included in future training? d) A description of the CTA and simulator process overview and evaluation; and e) how can we leverage the field solutions for the development of new training that uses more advanced medical simulation technology?**

Since the data collection has not yet been completed, this item on the SOW is not yet completed.

Section 2: Communication Difficulties that Prevented the Completion of our SOW

Since this project was approved and funded on 12 August 2004, our TATRC GOR, Dr. Carla Pugh has provided constant and helpful advice and support. Yet the best efforts of Dr. Pugh and our USC contracts and grants specialists did not result in replies to our repeated attempts to communicate about our IRB approvals or our request for TATRC approval to reduce our overhead rate to reflect our move to an off-campus facility and modify our budget to reflect data analysis needs.

August 04 to March 05

Our research design and protocol was approved by the University of Southern California (USC) Institutional Review Board on 5 December of 2004. We held a planning conference and invited our GOR, Dr. Pugh and a number of other specialists in education and medicine. As directed by

our agreement with TATRC, we immediately filled in all required paperwork and submitted our IRB approval documents to TATRC and ORP. We assumed that our protocol was approved. We started immediately to design the cognitive task analysis protocol and our design for data analysis. Dr. Pugh, our GOR, had encouraged us to begin locating and interviewing surgeons in February and March. On 11 March we applied for approval to lower our university overhead rate to 26% and modify our budget line items so that we could appoint a post doctoral fellow to assist in the development and analysis of our data. A copy of the email request from USC to TATRC is copied below:

Date: Fri, 11 Mar 2005 12:32:46 -0800
To: bill.delise@us.army.mil
From: George-Ann Cleary <gacleary@usc.edu>
Subject: Contract Number W81XWH-04-C-0093
Cc: clark@usc.edu, gacleary@usc.edu, ddarling@usc.edu
Dear Mr. Delise,
This email is a request for three items: 1) change in F&A rate from on-campus to off-campus; 2) shift funds from a Graduate Student position plus associated tuition to a Post Doctoral Research Associate; and 3) request a no-cost extension through 12/31/2005 (termination date is 9/12/2005).
Dr. Richard Clark, principal investigator, has moved to an off-campus site effective March 1, 2005. Attached is a spreadsheet reflecting a revised budget for your review and approval reflecting Dr. Clark's move to the off-campus facility in Redondo Beach which shows the adjustment of the F&A percentage to the University's lower rate of 26% MTDC and also breaks out the off-campus lease. The budget change amounts for the switch from graduate student to post-doctoral research associate are also shown in the attached spreadsheet.
NO-COST EXTENSION EXPLANATION:
The no-cost extension is needed because the collection of research data has been delayed due to research subjects and contacts going back and forth to Iraq. A grant extension is needed in order to provide enough time to produce the final analysis of collected research data.
If you need any further information, please don't hesitate to contact me directly. I trust you will look favorably upon these three requests.
Sincerely
Ms. George-Ann Cleary
Sr. Contract & Grant Administrator
University of Southern California

April to July 05

We had identified two prospective surgeons in March and so scheduled and conducted our first interview in early April 2005 (see SOW 1, 3, and 4 above). We subsequently had difficulty locating and/or scheduling surgeons for our study. Dr. Pugh suggested that we change our solicitation message so in May we sought USC IRB approval for a revised protocol. This revised protocol was sent to TATRC and HSRRB for approval. Our new strategy for locating and scheduling interviews with surgeons who had served in FST's was interrupted by an unexpected event.

We had received no reply to our repeated requests for a reduction in overhead and approval to hire a postdoctoral fellow or our revised solicitation protocol until June 20, 2005 when we were informed by our GOR, Dr. Pugh that we were on a list of TATRC projects that had not received initial HSRRB approval. This message was a shock since we had repeatedly sent inquiries about our request for lower overhead and had sent copies of our IRB approval a number of times when requested. We assumed that our HSRRB approval had been granted. All of our communications with TATRC about our HSRRB submission, except for communication with our GOR, Dr. Pugh, went unanswered until 17 June of 2005 when our GOR forwarded the following message about our HSRRB approval.

From: *Garland, Brian S Mr SAIC [mailto:Brian.Garland@DET.AMEDD.ARMY.MIL]*
Sent: *Friday, June 17, 2005 12:09 PM*
To: *Merritt, Cheryl*
Cc: *Duchesneau, Caryn L Ms USAMRMC*
Subject: *RE: Human Use Concerns HSRRB No. A-12752*
Dear Ms. Merritt,
I still haven't seen the IRB approval letter, IRB approved protocol and IRB approved consent form for this project. Maybe they we misdirected or something. All documents for this project would have come to me from Claudia Oglivie but I never received these 3 documents. I have many notes to the file that Claudia was going to follow-up with the PI on getting these documents submitted.
Could you ask the PI to send them again? Once I receive these documents I will have the file assigned to a reviewer.
Thanks,
Brian Garland
Administrative Coordinator
Office of Research Protections, Human Subjects Protection
MRMC-ORP

The requested documents were resent immediately. On 7 July, USC's contracts and grants specialist, Ms. George Ann Cleary had received the following email from Rebecca Tama:

Ms. Cleary,
I spoke with Dr. Pugh this morning and was informed that the actions you requested on 11 March 2005 have not been processed. Since Dr. Pugh concurs with your request, I see no problem in making the change. Unfortunately, Mr. Delise is in the process of moving to another team and will no longer be handling this award. I will ask the Customer Service Center Chief to assign this award to another Contract Specialist so a modification can be processed. My understanding is that a modification is required to incorporate a revised budget and incorporate a no-cost extension. Your original request referenced an attached revised budget which I do not have. Since Mr. Delise is out of the office, could you please submit this attachment to me so and also verify the end date for the no-cost extension? Your March email stated a new end date of 12/31/05 but I thought you might need the extension to be longer because of the delays that have been encountered. As soon as I have what I need from you, I'll ensure that this gets assigned to a Contract Specialist for prompt processing. Please contact me if you have any questions.
Thanks,

Rebecca Tama Contracting Officer
USAMRAA Account Manager

On 12 July, Dr. Clark and Dr. Pugh described the study and initial results in a paper titled "The Use of Cognitive Task Analysis in Surgical Simulations" at an Office Of Naval Research Conference titled "Metrics for Evaluating Performance in Simulations" held in Redondo Beach California.

On 25 July Brigit Ciccarello began helping us through the HSRRB process which finished with formal approval of our revised research protocol about 23 September 2005. Yet we were unable to continue the data collection because our funding was depleted due to the fact that our March request to reduce our overhead rate and modify our spending plan had not yet been approved.

August to September 05

To date, we have received a no cost extension until September 30, 2006 but we have not yet received a reply to our request to lower our overhead rate or adjust our budget. We have also requested additional funding to finish our SOW. We look forward to a reply to our requests and to the opportunity to complete our SOW.

KEY RESEARCH ACCOMPLISHMENTS

- The development of a surgical cognitive task analysis protocol (See Appendix A)
- The development of an index CTA for the use of Argyle Shunts (See Appendix B)

REPORTABLE OUTCOMES

- The development of a surgical cognitive task analysis protocol (See Appendix A)
- The development of an index CTA for the use of Argyle Shunts (See Appendix B)

CONCLUSIONS

The development of a surgical CTA protocol and the testing and revising of that protocol with an FST Surgeon has convinced us that the approach we are taking continues to be viable and productive. We now feel that we have a viable support system in place at TATRC and locally. We look forward to completing our study next year.

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APPENDIX A: Surgical CTA Protocol

Developed for TATRC Grant Award # **W81XWH-04-C-0093**
Richard E. Clark, Ed.D.

1. Establish general context for use of procedure, general indications and contraindications for use and any relevant history (see "Questions to be asked…" below, items 1-3).

2. Ask for a sequential explanation of the process. Emphasize that instructions should be given as they would to an intermediate medical student, and request that steps be described as specifically and completely as possible, including decisions that must be made, cues that must be attended to, etc. Remind the subject to use ordinal descriptors as frequently as possible (e.g. "First, do step 1. Second do step 2. Next, do step 3…"). Questions/clarifications should only be asked of the subject if the words used or pronoun-antecedent relationships are not clear. Ask also about the decisions that must be made and the criteria for choosing between the various alternatives when decisions are made (see "Questions to be asked…", below, items 4 and 5)

3. Recite the sequence back to the subject – that is, paraphrase what you hear them say. Ask for corrections and clarifications.

4. Ask the subject if the sequence after the corrections and clarifications is sufficient to allow someone to complete the task successfully (see "Questions to be asked…" below, items 6-7).

5. Take a break. Compile notes into a single, step by step, action and decision procedure.

6. Ask the subject to listen to you talk through the procedure as if someone was performing the procedure in a hypothetical situation. Instruct him to interrupt, clarify, or correct if anything said is inconsistent with how he/she would perform the procedure.

7. Review the corrected procedure with subject. At each identified decision point, ask for all relevant cues (see "Questions to be asked…" below, items 4-5). Verify by rephrasing as a question (e.g. "So, in order to make this decision, I only need to look at these two things?").

8. In preparation for a follow-up meeting, compile the written CTA document and send to the subject. Ask him/her to make any changes that are necessary to correct the accuracy of the CTA using the "track changes" function in Microsoft Word or to print a copy and bring handwritten notes for changes to the follow-up meeting.

9. At follow-up meeting, discuss all changes and finalize the CTA description. Explain to subject that when he is asked to review others' CTA documents, his role is to determine whether or not the task can be successfully completed using the steps presented. He should neither assume that something unstated is known nor that the CTA should exactly match his personal procedure. He should also edit any steps that are unnecessary. The

emphasis should be on whether or not the CTA document to be reviewed is viable and efficient to complete the task as written. Any changes that the subject wants to make should be made in the same manner as the edits to his own document.

Questions to be asked during the interview protocol

1) What happened? What were the problems being solved and the medical goal of this event? The objective of this question is to collect the expert's overview description of the "what, where, when, who, why" the event happened. In addition, background information on the precursors, context, preparedness, important and unexpected aspects of the event are collected as well as the expert's view of the goal to be achieved.

2) What conditions must be present to start the task? Here the goal is to collect information about the medical "conditions" or "indications and counter indications" that would permit medical personnel who have not experienced this event to know when it has occurred and how to identify it unambiguously. Any tests, observations or measurements that must be made are collected and described.

3) What is the reason for the unique or unexpected nature of this event? The goal here is to collect background information on why this event was perceived as unexpected or important. The interviewer usually asks what aspect of prior training or education prepared the expert for this event and what might prepare future surgeons more adequately to deal with it.

4) What actions and decisions must be implemented to complete the task? What alternatives must be considered and what criteria must be used to decide among the alternatives? This question is the core of a CTA interview. The expert is asked to describe, in a step-by-step fashion, everything that must be done to diagnose and treat the problem being investigated. This is often the second question that is asked (after #1, "what happened"). The answers to questions # 2 and 3 most often turn up as the expert describes the sequence they follow(ed) to diagnose and treat. As the sequence unfolds, the interviewer often interrupts with questions about the actions being described such as "Can you demonstrate on the simulator what you are describing?", or "Why did you do that?", or "What alternatives did you consider and what criteria did you use to make that decision?" and "What would lead you to make a different decision with another patient? Could you demonstrate a different set of constraints for that decision on the simulator?" The key issue in a CTA is to capture all of the many complex decisions that must be made, the alternatives that must be considered before a decision is reached and the essential criteria for choosing between the alternatives. It is knowing when and how to make decisions that are most often the source of errors in medical training since experts tend to automate their decision making. While experienced experts make very rapid and accurate decisions, they cannot observe what goes on in their mind as they decide and so often fail to report decisions or the range of alternatives they considered and rejected. This information contributes to training that is often very accurate when it depicts the observable actions that subject matter experts (SME) use to solve problems but unobservable decisions are often ignored or distorted. The goal of this aspect of the CTA is to produce an accurate, step by step description of the most efficient and effective way to reach the medical goal and sub-goals of the task.

5) What concepts, processes or principle knowledge is required to adjust this task to fit novel conditions? As the expert describes actions and decisions in response to question #4, the CTA interviewer occasionally interrupts and asks for details about three types of knowledge. A) Concepts -- An explanation of the special medical or scientific terms used by the expert. The interviewer asks for definitions and identifiable examples. Examples are collected (and scanned or otherwise stored on a computer for later use as illustrations in the CTA). Concepts are the type of knowledge that supports accurate classification of all aspects of the problem and solution. B) Processes -- An explanation of how something important to the goal works, stage by stage such as a disease progression or an organ system. Processes support clear understanding of the wider context of the systems involved in the problem and solution and help experts generate more adequate solutions to problems; and C) Principles - Essentially the "science" of the phenomenon being described in the form of variable cause and effect statements. Principles help identify and explain causes, solutions and the adjustment of procedures to accommodate highly important incidents related to the problem being studied. These three types of knowledge will eventually be reorganized and presented as the body of conceptual and scientific knowledge that will support the diagnosing and treating of the problem and the editing of established treatments to accommodate unusual cases.

6) What equipment and materials are required? The objective with this question is to determine if any unusual medical equipment or supplies, not usually available in the context where this problem might occur, need to be provided in order to effectively diagnose and treat the problem effectively. Descriptions of equipment are collected and scanned or stored on a computer for later use in the CTA report.

7) What performance standards must be achieved? (E.g. time, accuracy). All essential quantity and quality standards for the diagnosis and treatment of the problem must be identified so that they can be described in assessment instruments and for eventual training media and materials.

APPENDIX B: CTA of Argyle Shunt Procedure with Surgeon #1

Surgical use of Argyle shunt for lower extremity
Vascular disruption in an Iraq FST context

FST Surgeon #1
Specialty: Orthopedic Surgery
Rank: Major
Institute for Surgical Research
Brooke Medical Center
Fort Sam Houston, San Antonio, TX

Task Analyst: Richard Clark, Ed.D.
Rossier School of Education
University of Southern California
Los Angeles, CA

April 5, 2005

Draft 2, Corrected with comments by Surgeon #1

Goal: Restore blood flow in Forward Surgical Team (FST) setting when vascular injury to thigh has significantly reduced or eliminated flow to lower extremity and threatens life or limb

Conditions:
Indications:

- Penetrating injury to thigh and/or lower extremity and
- Reduced or no pulse distal to injury and/or
- Doppler bi-phasic or mono-phasic indication in profunda and
- Limb is cool below injury and warm above
- Capillary refill is slow
- And/ABI is less than .8
- Or/Transfer time to CASH and/or CASH load would risk patient life or limb

Contraindications:

- Injury is so severe shunt will not establish flow and amputation indicated?
- CASH transfer time and medical staff availability is adequate for Pt treatment?

Equipment: (*add later*)

Task List:

1. Assess injury and decide whether blood flow needs to be reestablished
2. If reduced flow threatens patient life or limb, surgically assess injury and determine treatment
3. Prepare site of injury, insert Argyle shunt and check for additional injuries
4. Communicate FST treatment for CASH surgical team and arrange Pt transport to CASH

Task 1: Assess lower extremity injury and decide whether blood flow needs to be reestablished

Goal: Decide extent of injury and whether it is possible and desirable to reestablish flow in FST or transfer patient to CASH

Conditions: Pt has penetrating injury to thigh

Step 1.1 Conduct standard assessment of extent of Pt injury and current condition

Step 1.2: Assess blood flow distal to injury with palpation and Doppler

IF palpated femoral pulse in groin is strong and pulse distal to injury is strong and no other significant injury, THEN go to Task 4 and transport Pt to CASH

IF distal palpated pulse is weak check ABI

IF ABI is >.8 THEN check Doppler

IF Doppler is tri-phasic, go to Step 1.3

IF distal area is cool and/or capillary refill is slow and/or Doppler is bi- or mono-phasic go to Step 1.3

Step 1.3: Use ultrasound to assess blood flow distal to injury

IF ultrasound picture indicates limited or no flow, or picture is unclear go to Step 1.4

Step 1.4: Decide whether to send Pt to CASH or treat in FST

IF transport time to CASH is excessive or uncertain and if transported, Pt might experience threat to life or limb, THEN treat at FST and go to Task 2

Standard is "Do not treat in FST unless necessary to preserve life or limb"

IF injury does not obviously threaten life or limb and availability of surgeon in CASH and/or transportation time to CASH seems not to threaten Pt life or limb, go to Task 3 (transportation)

Task 2: If reduced flow threatens patient life or limb assess injury and determine required treatment

Conditions: Pt needs treatment in FST for reduced or stopped blood flow because of impact injury to thigh and excessive time required to transport to CASH so that Pt life or limb is threatened. Surgeon is exploring injury area surgically to expose and identify vascular injury

Step 2.1: Determine bone injury and stabilize bone if possible

IF a significant unstable bony injury is found and surgeon can stabilize in reasonable amount of time (+/- 10 minutes), THEN stabilize bone quickly to protect sutures

Step 2.2: Expose zone of injury to identify specific vascular injury

IF artery severed or the surgeon wants maximum control of blood flow, THEN expose femoral artery and vein in groin proximally, and ligate.

Step 2.3: Expose injured segment of artery,

IF exposure indicates partial thickness injury to Intima THEN Doppler directly on artery

IF Doppler indicates flow decreases and stops THEN assume lack of blood flow and go to Step 2.4

IF Doppler indicates flow does not decrease, THEN ?

Step 2.4: Place Bulldog clamps on artery above and below injury

Task 3: Prepare site of injury and insert Argyle shunt

Step 3.1: Identify, isolate and prepare non-viable portion of artery

IF partial thickness injury, THEN use Iris scissors and remove damaged segment, clean up edges of artery so that all levels are even and go to Step 3.2

IF severed artery, THEN clean up edges with Iris scissors to insure that Intima is even with other artery levels and go to Step 3.2

Step 3.2: Check for thrombosis in artery

IF thrombosis indicated, THEN use Fogartey catheter with saline balloon dilator to pull out thrombosis 8 to 10 cm proximally and then flush vessel with Heparin and go to Step 3.3.

IF no thrombosis, go to Step 3.3

Step 3.3: Pass two loops of large gauge (#2 to #4) ligatures around artery approximately 2 cm above and two loops the same distance below cut to ligate.

Step 3.4: Size vessel diameter and measure length of required shunt and THEN select longest and widest, Argyle shunt possible to accommodate blood flow and limb movement during transportation to CASH

Step 3.5: Irrigate shunt with saline solution, open the bulldog clamp on one end, insert Argyle shunt into vessel proximally and close clamp over end of shunt. Repeat at distal end of vessel.

Step 3.6: Release proximal bulldog clamp and check for blood flow by palpating pulse digitally

Check IF blood flow is adequate by palpating digitally, THEN if flow is adequate go to step 3.8

IF blood flow is inadequate, THEN go to Step 1.2 and use Doppler to check again for additional distal injury and repeat procedure to this point. Examine carefully to insure that no other injury exists.

Step 3.8: Open distal bulldog clamp and check blood flow to distal side and palpate pulse digitally

IF blood flow inadequate, THEN Doppler site and flush with heparin and go to Step 3.9

IF blood flow is adequate both proximally and distally suture proximal and distal ligatures to secure shunt and go to step 3.9

Step 3.10: Palpate for compartment syndrome

IF compartment syndrome found or IF time to transport Pt to CASH is issue, open compartment linings surgically

Whether flow improves or not, provided that flow is restored to key areas of leg, go to Task 4 and transport to CASH

Task 4: Communicate FST treatment record to CASH surgical team and arrange Pt transport to CASH

Goal: Use every means to insure that accurate and complete information about injury and FST treatment reaches CASH treatment team with Pt. Paperwork is sometimes lost and radio communication with CASH is sometimes interrupted so as many backup records should be made available as is possible.

Conditions:

FST team has provided all immediate treatment required to preserve life and limb
While Pt may need much more care, CASH is best context for next level of treatment.

Step 4.1: Complete Patient Care Notes (SF-600) and attach securely to Pt so propeller wash from helicopter does not blow away.

Step 4.2: If available, radio CASH to provide verbal description of Pt name, evaluation, treatment and needs when Pt arrives at CASH – empathize shunt placement and time since injury

Step 4.3: Repeat information given in 4.2 to Medics accompanying Pt to CASH and instruct them to relay to CASH

Step 4.4: If possible, burn PC based CD of x-ray's, and clinical data notes and place CD on Pt

Step 4.5: If possible, put wide band of tape securely across dressing and with indelible marker, write Pt name, the time injury occurred, diagnosis, FST treatment and Pt needs.

End